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January 15, 2004

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NMED Hazardous Waste Bureau

Mr. David Cobrain
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building One
Santa Fe, New Mexico 87505-6303

TA-16 (16-016(c)-99, 387 Flash PAD, MDA P, 16-018, 386 Flash Pad, 16-016(c), 16-006(e) 16-010(b)

Reference: Work Assignment No. 06110.130.0003; State of New Mexico Environment Department, Santa Fe, New Mexico; Human Health and Ecological Risk Assessment Support; Review of the Material Disposal Area P Site Closure Certification Report, Task 3 Deliverable.

Dear Mr. Cobrain:

Enclosed please find the deliverable for the above-referenced work assignment. The deliverable consists of human health and ecological risk assessment review comments on Los Alamos National Laboratory's (LANL) "Material Disposal Area P Site Closure Certification Report" dated October 2003. The review focused primarily on Sections 2 and 3 and associated appendices.

Overall, the risk assessment sections were poorly written and it was difficult to follow the methodology and underlying assumptions. There is concern over the methodology employed for the site screening assessment. LANL compared the 95-percent upper confidence limit (95% UCL) to screening action levels (SALs). Typically, the site maximums are compared to the SALs, and for those constituents that do not pass this first screen, a more site-specific risk assessment is conducted. However, the report (Section 4.1) indicates that the approach taken is consistent with the New Mexico Environment Department- (NMED) approved protocol. Appendix D of the report does not provide any documentation related to this agreement. NMED should review this protocol to ensure that the approach followed in the closure report is consistent with the protocol. If the protocol does not specifically address the comparison of the 95% UCL to the SAL, then a comment requiring the comparison of the site maximum to the SAL is warranted.

The ecological risk assessment was based solely on data endpoints/toxicity reference values (TRVs) available in the LANL ECORISK database. Many of the inorganic constituents were dropped from analysis, as the TRVs were less than background. This is an appropriate action. However, there is concern that only one database was used to

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derive the TRVs. Other studies are available (e.g., Sample *et. al.* 1997) and widely used for deriving toxicity data for ecological risk assessors. A comment was drafted concerning this issue; however, the comment may not be appropriate if this approach was previously approved by the NMED.

It is anticipated that the human health and ecological risk assessment sections will require significant revisions. Additional comments may be generated upon the review of the revised sections.

In addition to the comments in the attached deliverable, specific concerns, as outlined in the December memorandum from the NMED, have been specifically addressed in the following paragraphs.

1. **We are particularly concerned with contamination that has migrated off-site to the Cañon de Valle since 1950s and could have moved further to groundwater and downstream as a result, LANL may have not addressed all relevant pathways for contaminant transport. What are your thoughts?**

   Agreed. The report states on more than one occasion that migration of soil into Cañon de Valle has occurred via site run-off. In addition, although run-off control measures are in place, there is no evidence that the controls have been 100% effective and that there has never been a breach of the control mechanisms. The report does not provide adequate justification that off-site migration has not occurred, and therefore, the potential for contamination in Cañon de Valle should be addressed in the report. At a minimum, the report should indicate that the human health risks associated with exposure to contaminants in Cañon de Valle will be addressed in a separate report. A comment has been drafted regarding this issue.

2. **Some of the inorganic contaminants (e.g., manganese, cadmium) were eliminated based on statistical analyses. LANL subjected these contaminants to statistical tests, some of which passed one statistical test and failed another. Is it appropriate to drop the COPCs [constituents of potential concern] from further consideration based on these tests when LANL has already identified background UTLs [upper tolerance limits] for inorganic constituents and baseline UTLs for radionuclides? See attached document.**

   The first step in screening inorganic COPCs is to compare the site maximum concentration to background (the UTLs as summarized in the provided background document). If a constituent fails this comparison, statistical test are conducted to assess whether the distributions between the site and background are different (e.g., the Wilcoxon Rank Sum (WRS) Test). If the WRS test indicates that that the distributions are different, other statistical tests can be employed. These tests may include histograms, box-and-whisker plots, and/or geochemcial analyses. LANL chose to follow the WRS test with a quantile test, which involves a comparison of the upper distributions of the data sets. It is not uncommon to see a constituent fail the

WRS test and pass another statistical test and thus be dropped as a COPC. However, typically these other statistical tests are subjective and rely on professional judgment. Summarizing, the overall methodology used by LANL is acceptable. For each constituent that had conflicting results between the WRS test and the quantile plot, the box-and-whisker plots provided in Attachment 2 to Appendix A were reviewed. The conclusions as noted in Tables 3.2.1-4 and 3.1.1-9 are generally acceptable and the list of COPCs as identified in these tables is also acceptable. The only constituent that appeared borderline was the manganese distribution in tuff. Based upon review of Figure B-12b (Attachment 2 of Appendix A), the site concentrations may be slightly elevated. However, interpretation of results of the box-and-whisker plots is highly subjective and the overall impact of excluding manganese is most likely negligible. Therefore, no comments were generated on this issue.

3. **Some of the organic contaminants were eliminated because the detection frequency was less than 5%. Should the contaminants like dinitrotoluene be eliminated since HE [high explosives] and TNT [trinitrotoluene] were COPCs at the site? We don't believe they should.**

   Agreed. The EPA guidance (*Risk Assessment Guidance for Superfund* [RAGS], 1989) cited in the closure report allows for the elimination of chemicals from a risk assessment if it is detected infrequently (e.g., less than 5% per 20 samples), not detected in other sampled media, and/or if there is no reason to believe the chemical may be present. However, RAGS clearly states that, "chemicals expected to be present should not be eliminated" from the risk assessment. Since the closure report provides evidence that these constituents have been historically present at the site, and the waste data indicates the presence of these constituents, there is sufficient justification to warrant the inclusion of these constituents in the risk assessment. A comment has been drafted accordingly.

4. **The distribution for most of the samples was non-parametric, please check if the appropriate statistical analysis were applied. We are not sure if the UCLs [upper confidence limits] were calculated using appropriate method(s), UCLs presented are of much lower value than maximum concentrations reported (Table 4.2.2-1, Appendix A Tables). We hope that some of the high values were not dropped as outliers rather than being identified as hot spots. The bootstrap method used to calculate UCLs gives the lowest values.**

   It is generally agreed that the UCLs are lower than the site maximums in many cases, however, the UCLs are above all of the respective means. The abundance of non-parametric distributions is not that uncommon and did not raise any immediate flags. The method used by LANL for determining distributions and calculating the UCLs is in accordance with the latest EPA guidance: *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites*, December 2002. The ProUCL software was developed by Lockheed Martin to perform the calculations described in the guidance. No comments were generated on the methodology used

for determining the UCLs.

5. **What are your thoughts on the use of two residential plots, one in exposed tuff zone and one in biological zone to demonstrate that no unacceptable risk exists at the site?**

   In general, there are some concerns over how the biological zone was defined. The primary concern is whether the topsoil is clean soil brought in from another area, and if so, is it appropriate to use analytical data from this soil in the risk assessment. A comment has been drafted requesting more detail as to the inclusion of topsoil analytical results in the risk assessment. However, the delineation of the area into two distinct zones and evaluating risks separately may be a conservative approach. The evaluation of the exposure tuff area actually provides a more realistic picture of site risks without the inclusion of institutional controls (i.e., re-vegetation and topsoil). However, it appears that Ms. Kirby Olsen, formerly of the NMED, agreed to this approach. The document of a meeting (dated 09/04/02) between NMED, LANL, and Shaw Environmental is provided at the end of Appendix D. It is not clear from the notes, but the separation of the site into two areas was discussed and it states that, "Ms Olsen provided agreement to proceed with the MDA P risk assessment as presented in the meeting". As it appears that this approach was previously approved by NMED, no comment has been drafted concerning this issue.

The document is formatted in Word. The deliverable was emailed to you on January 14, 2004 at David_Cobrain@nm env.state.nm.us. A formalized hard (paper) copy of this deliverable will be sent via mail. If you have any questions, please call me at (303) 763-7188 or Ms. Paige Walton at (801) 451-2978.

Sincerely,

June K Dreith

June K. Dreith
Program Manager

Enclosure
cc: Mr. John Kieling, NMED
Neelam Dhawan, NMED
Ms. Paige Walton, TechLaw

TASK 3 DELIVERABLE

# REVIEW COMMENTS ON THE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, MATERIAL DISPOSAL AREA P SITE CLOSURE CERTIFICATION REPORT, LOS ALAMOS NATIONAL LABORATORY OCTOBER 2003

**Human Health and Ecological Risk Assessment Support**

**Submitted by:**

**TechLaw, Inc.**
**560 Golden Ridge Road**
**Suite 130**
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**Submitted to:**

**Mr. David Cobrain**
**State of New Mexico Environment Department**
**Hazardous Waste Bureau**
**2905 Rodeo Park Drive East**
**Building One**
**Santa Fe, New Mexico 87505**

**In response to:**

**Work Assignment No. 06110.130**

**January 14, 2004**

# REVIEW COMMENTS ON THE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, MATERIAL DISPOSAL AREA P SITE CLOSURE CERTIFICATION REPORT, LOS ALAMOS NATIONAL LABORATORY OCTOBER 2003

## General Comments

1. The risk assessment evaluates two areas: the biological zone and the exposed tuff area. The biological zone is described as undisturbed areas or reclaimed areas of tuff covered with two to five feet of topsoil. There is some concern as to what the risk assessment actually evaluates related to biological zone. Typically, closure risk assessments are conducted on site levels without the inclusion of institutional controls. In the case of Material Disposal Area P (MDA P), the institutional control is topsoil. Provide the following clarifications:

    - Is the topsoil that covers the reclaimed areas clean soil that was brought in from off-site or was this soil non-contaminated soil removed from MDA P and set-aside for reclamation?

    - Do the surface soil samples used in the risk assessment represent the topsoil?

    - If the topsoil is not native to MDA P and was brought in from another area, and the analytical results used in the risk assessment represent the topsoil concentrations, discuss how representative the risk assessment is relative to assessing the actual conditions of MDA P prior to remediation and re-vegetation (i.e., institutional controls).

2. Essential nutrients (i.e., calcium, sodium, magnesium, potassium, and iron) were eliminated from the human health risk assessment. While studies have indicated that calcium, sodium, and potassium are relatively non-toxic, studies have shown there to be an upper intake limit for iron and magnesium. The United States Department of Agriculture (USDA) Food Safety and Inspection Service and the National Academy of Science (NAS) Food and Nutrition Board have developed upper intake levels (ULs) which should applied in determining a soil screening level (SSL) that should be used in assessing essential nutrients toxicity. If site concentrations of magnesium and iron are below the SSL, they may be eliminated from further consideration in the risk assessment. Revise the report accordingly.

3. The risk assessment does not address risks to human health through exposure to contaminants in Cañon de Valle. The report states on more than one occasion that migration of surface water due to run-off and large precipitation events has occurred and that this water eventually terminates in Cañon de Valle. Although run-off control measures are in place, the text in the report does not convey that the controls have

been one-hundred percent (100%) effective and that there has never been a breach of the control mechanisms. The report does not provide justification that off-site migration has not occurred, and therefore, the potential for contamination in Cañon de Valle from site contaminants should be addressed in the report. At a minimum, the report should indicate that the human health risks associated with exposure to contaminants in Cañon de Valle will be addressed in a separate report. Revise the closure report to provide discussion on the potential nature and extent of contamination in Cañon de Valle from contaminant transport from Material Disposal Area P (MDA P) and how human health risks associated with exposure to these constituents will be evaluated.

4. For the ecological risk assessment, a screening evaluation was conducted first. For those constituents that did not pass the screening evaluation, additional analysis was conducted. For the biological zone, only barium and high explosive (HE) and RDX were carried forward. However, an actual evaluation of ecological risks within the biological zone was not conducted, but rather an evaluation of potential risks in Cañon de Valle were discussed and used as surrogates. It is not clear why this approach was taken. The biological zone at MDA P and Cañon de Valle are different environments and are affected by different source mechanisms. Two distinct evaluations should have been conducted: one for the biological zone using MDA P data and one for Cañon de Valle. Revise the closure report to include an evaluation of the actual risks to receptors to MDA P soil.

5. It appears that only the ecological risk assessment for Cañon de Valle was conducted using only data from the overbank soils. It is not clear how a complete assessment using only this data was conducted. The risk assessment must include all complete exposure pathways. Revise the risk assessment to clarify all the data that was used in the assessment of Cañon de Valle and discuss all the exposure pathways evaluated.

**Specific Comments**

1. Section 2.4.3, Confirmation Sampling Results, pages 62 - 68. Several organics were eliminated as a constituent of potential concern (COPC) based upon low detection frequencies. The Environmental Protection agency (EPA) guidance (*Risk Assessment Guidance for Superfund* [RAGS], 1989) cited in the closure report allows for the elimination of chemicals from a risk assessment if it is detected infrequently (e.g., less than 5% per 20 samples), not detected in other sampled media, and/or if there is no reason to believe the chemical may be present. However, RAGS clearly states that, "chemicals expected to be present should not be eliminated" from the risk assessment. The closure report provides evidence that these constituents have been historically present at the site, and a review of waste data collected in 1999 and 2000 indicate the presence of these constituents in waste removed from the site. Thus, there is sufficient justification to warrant the inclusion of these constituents in the risk assessment. At a minimum the risks to these constituents should be evaluated separately, and overall risks with these COPC included and excluded be compared.

Revise the risk assessment to include all organic constituents that have been historically present on-site, regardless of detection frequency. For the biological zone, the risk assessment should include benzoic acid, 1,4-dichlorobenzene, 1,3-dinitrobenzene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 3-nitrotoluene, 4-nitrotoluene, and tetryl. For the exposed tuff zone, the risk assessment should include di-n-butyl phthalate, 1,3-dinitrobenzene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-methylnaphthalene, 4-nitrotoluene, and tetryl.

2. Section 2.4.3, Confirmation Sampling Results, Table 2.4-11, page 67 - 68. The table does not include references to which compounds were eliminated based upon the less than 5% detection frequency. Revise the table to include this notation (similar to table 2.4.10). No response to this comment is required.

3. Section 2.5.3.3.1, Screening Results, page 89. Version 1.4 of the ECORISK database was used. Provide justification for not using version 1.5, which was released in September 2002. In addition, several COPCs were eliminated from the assessment, as the data provided in ECORISK was less than background and thus, deemed not appropriate for use. Discuss why other sources for ecological toxicity data were not used in these cases.

4. Section 2.5.3.3.2, Problem Formulation, page 89. The text states that chemicals with seven or fewer detections in soil above the soil background value are rendered inaccessible to receptors. This is not a valid statement. First, 100% of the site was not sampled, and secondly, the lower detection frequency above background does not render the chemicals inaccessible but rather lowers the potential for exposure but does not eliminate it. Revise the text to remove the discussion on these chemicals being inaccessible to receptors due to low frequency of detection above background. In addition, there is reasonable evidence to conclude that these chemicals are present at the site due to site activities. The exclusion of these chemicals as COPCs based upon the low frequency of detections is not valid (unless the statistical analyses concludes otherwise). Revise the risk assessment to address risk associated with exposure to these constituents.

5. Appendix A, Section 3.3, page 13. The risk assessment is based upon a depth of exposure of zero to five feet, and the 95% UCL was determined from concentrations within this range. It is unclear why a range of zero (0) to five (5) feet was assumed an appropriate exposure pathway. EPA defines surface soil as 0 to 0.5 feet and subsurface soil as below 0.5 feet. Typically a risk assessment will evaluate exposure to surface and subsurface soil separately, not combined as in the closure report. It appears that the development of one 95% UCL to represent all soil is not a conservative approach and most likely underestimates the actual risks that could be received through exposure to surface soil. This assumption is based upon the fact that concentrations lessen with depth. Revise the risk assessment to include an assessment to surface soil (0 to 0.5 or 0 to 1 foot) and one to subsurface soil (below 0.5 or 1 foot).

6. Appendix A, Section 4.2.3, page 17. The text states, "For the biological zone, as single detection of barium in grid 189 was measured...and results in an HQ of 1.3. However, this barium concentration was within the other concentration evaluated in the residential lots." It is not clear what meaning these sentences are trying to convey. It appears that the elevated HQ is typical of the rest of the site, and therefore, unacceptable risks would prevail across all residential lots, which contradicts the conclusion of the report. Clarify the text.

7. Appendix A, Section 4.2.3, page 17. It is not clear how the residential lots were chosen. It is also not clear how many lots were evaluated. Based on Figure 1.5-2, it appears that only two lots were evaluated. The primary focus for this evaluation also appears to be barium and noncarcinogenic risks. However, the report does not discuss potential exposure to organics and other carcinogens. If the worst-case location for noncarinogenic risks was evaluated, then the worst-case location for potential carcinogenic risks should have also been evaluated. Revise the text to indicate how many lots were evaluated, the methodology for selection of the lots, and the representativeness of the evaluation for potential exposure to organics and carcinogenic risks.

8. Appendix A, Section 5.3.2.3, page 29. Barium and HMX were not included in the screening assessment, as the EcoRisk version 1.4 did not contain toxicological criteria for the respective constituents. Risk assessments rarely rely on only one source for toxicological criteria. While it is noted that avian and invertebrate toxicity data may in fact not be available, other sources and studies for avian toxicological criteria should be reviewed to determine whether toxicity data is available. Revise accordingly.

9. Appendix A, Section 5.6.3, page 40. The conclusion of the assessment indicates that there are no adverse impact to Cañon de Valle from migration of contaminants from MDA P. However, risk assessments conducted on Cañon de Valle for other sites within Technical Area (TA) 16, specifically in conjunction with Solid Waste Management Unit (SWMU) 16-021(c) 99, which is slightly upgradient of MDA P have indicated otherwise. This SWMU 16-021(c) 99 ecological risk assessment provides a lengthy discussion on the results of toxicity testing that had been conducted to determine whether the concentrations in sediments have impacted the benthic macro-invertebrate community. The results of the study showed a decrease in numbers of species and potential toxicological impacts. In addition, the report implies that these results may be due more to the loss of habitat due to drought conditions than to contaminant loading into the surface water. However, the report further indicates that if there are pockets of sediment causing adverse effects on the aquatic community, the benthic community would most likely avoid these areas. If the stream is in fact being highly impacted by drought, then this would equate to a decrease in area of available habitat. Given these conditions, the benthic community would be more likely to be pushed into areas of unfavorable habitat due to competition. This would result in multiple stresses on the organisms. It appears that under the current drought conditions, the preservation of habitat is critical to the

health of the stream community and that even small impacts by site contaminants could be detrimental. Revise the report to address these issues.

10. Appendix A, Table 3.2.1-1. The background soil value listed for vanadium is 36.6 mg/kg. This appears to be a typographic error, as the soil background value for vanadium should be 39.6 mg/kg, as noted in Table 6.0-1 of the document *Inorganic and Radionuclide Background Data for Soil, Canyon Sediments, and Bandelier Tuff*, LANL 1998. Revise the table accordingly.

11. Appendix A, Tables 4.2.2-1, 4.2.2-2, 4.2.3-1, and 4.2.3-2. Attachment 2 of Appendix A discusses the statistical methods that were used to determine the 95% UCLs. However, two tests for lognormal distributions are discussed. It is not clear which test (either the Land's H or MVUE) was applied for estimating the 95% UCL in cases of lognormal distributions, as the table do not note which test was applied. For all normal distributions it was assumed that the Student T test was used and for non-parametric, the Bootstrap method. Clarify which test was used for each constituent when the distribution was lognormal.

12. Appendix A, Table 4.2.2-3. The 2003/2004 EPA Region 6 SALs for residential soil were reviewed and compared against the SALs listed in Table 4.2.2-3. Consideration was given for the data of the report versus dates of updated toxicity data. Two comments on the table are noted:

    - There is a large discrepancy between the SAL for cobalt as listed in the table (4,500 mg/kg) and in the Region 6 SAL table (900 mg/kg). Review of toxicity data does not indicate that there have been any updates. Verify the SAL for cobalt.

    - Clarify that Arochlor-1254 was used as a surrogate for Arochlor-1260.

11. Appendix A, Table 4.2.2-4 and 4.2.3-6. Both beryllium and cobalt are carcinogenic via inhalation, and as such, carcinogenic effects should be evaluated. Revise the tables to include beryllium and cobalt.